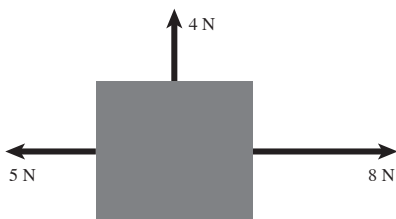


CHAPTER 5 PRACTICE QUESTIONS

Directions: Complete the following problems as specified by each question, and then check your work using the solutions that follow. For extended, step-by-step solutions, access your Student Tools online.

1. A box of mass 5 kg is pushed along a horizontal, smooth (i.e., frictionless) surface with a horizontal force of 15 N. What is the acceleration of this box (both magnitude and direction)?
2. A 1000 kg elevator descends with an acceleration of 2 m/s^2 . What is the tension in the cables supporting the elevator?
3. A 10 kg box on a flat surface has three forces applied to it, as shown in the figure below. What is the net force on this box? What is the normal force on this box?
5. A box of mass 5 kg slides down an incline of 40° . If the coefficient of kinetic friction is 0.4, what is the box's acceleration down the ramp?
6. In the previous question, if the ramp's height is 1 m and the box starts from the top at rest, how long will it take to reach the bottom?
7. If the coefficient of static friction between a box and an incline is μ_s , what is the maximum angle that the incline could be without the box sliding down?

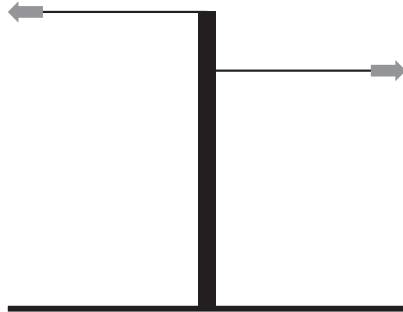


4. Two forces act on an object of mass 8 kg on a flat surface: $\vec{F}_1$ acts along the positive x -axis with a magnitude of 8 N, and $\vec{F}_2$ acts at an angle of 37° above the negative x -axis with a magnitude of 10 N. What is the net force on the object?
8. Two boxes, A and B, are stacked with box B atop box A. Assume that there is friction between all surfaces. If a person pulls on box A, the system moves as a whole.
 - (a) When the acceleration is nonzero, is there friction on the lower surface of box A? If so, what kind?
 - (b) When the acceleration is nonzero, is there friction on the lower surface of box B? If so, what kind?
9. You put a force of 10 N perpendicular to the end of a wrench of length 0.5 m, what is the torque you are putting on the wrench?

DRILL

10. Imagine a basketball player spinning a ball on his finger. If he slaps the ball with a force of 10 N tangential to its surface, and the ball has a mass of 0.6 kg and a radius of 24 cm, what is the angular acceleration of the ball?
11. In the previous example, imagine the friction between his finger and the ball produces a uniform angular acceleration of -10 rad/s^2 . How long would it take the ball to stop spinning if the ball were originally spinning at 50 rad/s ?

12. A telephone pole is embedded in the ground and has two telephone lines putting tensions on it as shown in the following figure.



If the upper wire has a tension of 10 N on the pole, and the lower wire has a tension of 8 N, what is the net torque on the pole? Consider the pole to have a height above the ground of 8 m and the lower wire is 7 m above the ground.